CLAIMS

What is claimed is:

1. An indicator protein comprising:

a) a first binding moiety having a binding domain specific for a class of analytes that undergoes a reproducible allosteric change in conformation when said analytes are reversibly bound;

b) a second moiety and third moiety that are covalently linked to either side of said first binding moiety in a manner that said second and third moieties undergo a change in relative position when said analyte molecule binds to said first binding moiety; and

c) said second and third moieties interact to produce a change in optical properties when the relative positions of said second and third moieties change, wherein said change can be monitored remotely by optical means.

2. The protein of claim 1, wherein

a) said first binding moiety is a protein that undergoes allosteric conformational changes when glucose reversibly binds;

b) said second moiety is a fluorescent protein;

c) said third moiety is a protein that has an absorption spectrum that overlaps the emission spectrum of said second moiety;

d) the fluorescent energy transfer changes from said second moiety to said third moiety when glucose binds to said first binding moiety; and

e) hybrid fusion joins said first, second and third moieties.

3. The protein of claim 2 wherein said third moiety is a fluorescent protein that can emit light when fluorescent energy transfers from said second moiety and said third moiety.

4. The protein of claim 2, wherein

a) said first binding moiety is a glucose binding protein from E. coli;

b) said second moiety is EBFP; and

c) said third moiety is hemoglobin.

5. The protein of claim 2, wherein

a) said first binding moiety is a glucose binding protein from E. coli;

b) said second moiety is YFP; and

c) said third moiety C is GFP.

6. The protein of claim 5 having the plasmid sequence shown in Figure 8.

7. A biosensing system for glucose comprising:

a) a biosensor element consisting of a protein

i. having a first binding moiety, which is a glucose binding protein from E. coli, having a binding domain specific for glucose that undergoes a reproducible allosteric change when glucose is reversibly bound;

ii. having a second moiety and third moiety that are covalently linked to either side of said first binding moiety in a manner such that they change in relative position when glucose binds to said first binding moiety and wherein said second moiety and said third moiety interact to produce a change in optical properties when their relative positions change wherein said optical properties change can be monitored remotely by optical means; and

iii. that is immobilized to a solid surface or retained within a permeable capsule;

b) the placement of said biosensor element in contact with a fluid of interest so that said biosensor element can be illuminated and emitted light detected; and

c) an optical system for illumination of said biosensor element and detection of emitted radiation.

8. A biosensing system for glucose of claim 7 wherein said second moiety is EBFP and said third moiety is hemoglobin.

9. A biosensing system for glucose of claim 7 wherein said second moiety is YFP and said third moiety is GFP.

10. A biosensing system for glucose of claim 8 wherein said contact with a fluid of interest is subcutaneous.

11. A bionsensing system for glucose of claim 9 wherein said contact with said fluid of interest is subcutaneous.

12. A biosensing system for glucose of claim 8 wherein said contact with a fluid of interest occurs through a bioreactor.

13. A biosensing agent for glucose of claim 9 wherein said contact with a fluid of interest occurs through a bioreactor.

14. A biosensing system of claim 7 further comprising an instrument to measure changes in the fluorescence properties of said second moiety and said third moiety.

15. A method for noninvasively measuring glucose within cells wherein

a. plasmid coding for a protein having

i. a first binding moiety having a binding domain specific for a class of analytes that undergoes a reproducible allosteric change in conformation when said analytes are reversibly bound;

ii. a second moiety and third moiety that are covalently linked to either side of said first binding moiety in a manner that said second and third moieties undergo a change in relative position when said analyte molecule binds to said first binding moiety; and

iii. said second and third moieties undergo a change in optical properties when the relative positions of said second and third moieties, wherein said change can be monitored remotely by optical means.

is introduced into cells;

b. said protein is expressed in the cells; and

c. said changes in fluorescence properties are measured optically by an instrument having an optical system for illumination and detection of emitted radiation.

16. A method for noninvasively measuring glucose within cells of claim 15 wherein said second moiety is YFP and said third moiety is GFP.

17. A method for noninvasively measuring glucose within cells of claim 15 wherein said second moiety is EBFP and said third moiety is hemoglobin.